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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/693,619	10/24/2003	Erlend Ronnekleiv	WEAT/0349	1501
36735	7590	05/05/2006		
PATTERSON & SHERIDAN, L.L.P. 3040 POST OAK BOULEVARD, SUITE 1500 HOUSTON, TX 77056			EXAMINER DETSCHER, MARISSA	
			ART UNIT 2877	PAPER NUMBER

DATE MAILED: 05/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/693,619

Applicant(s)

RONNEKLEIV, ERLEND

Examiner

Marissa J. Detschel

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-19 is/are allowed.
- 6) ☒ Claim(s) 1, 5-7, 9-11, 20, 22, 23 and 27-29 is/are rejected.
- 7) ☒ Claim(s) 3, 4, 8, 12-14, 21, 24-26, and 30-32 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

The amendment filed on March 29, 2006 has been fully considered by the Examiner. In view of this amendment, the objections to the disclosure and claims have been withdrawn.

### ***Response to Arguments***

Applicant's arguments filed March 29, 2006 have been fully considered but they are not persuasive.

The Applicant argues that the prior art of Davis and Kersey do not disclose the limitation of the co-location of at least one reference optical device or reference interferometer with the optical sensor or sensor interferometer. Based on the Applicant's disclosure and figures (specifically, Figures 1, 3A, and 3B), the examiner interprets this co-location of the at least one reference optical device or reference interferometer with the optical sensor or sensor interferometer as being one where they are located along the same optical path or fiber. The reference and sensor interferometers of Kersey are co-located along the same optical fiber path that runs from 17, through 19, and into 21 and 23. The reference and optical sensor of Davis are co-located along the same path (104) as illustrated in figures 5 and 6.

Therefore, the Applicant's arguments for claims 1, 2, 5-7, 10, 11, 20, 22, 23, 27, and 29 as presented in the arguments filed January 3, 2006 are not found persuasive because the prior art presented in the previous Office Action discloses the Examiner's

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interpretation of the co-location of at least one reference optical device or reference interferometer with the optical sensor or sensor interferometer.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 5-7, 20, 22, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Davis et al. (USPN 6,403,949).

Davis discloses a device that measures wavelengths of signals, and wavelength and frequency measurements of a device exemplify the same concept. Therefore, the device of Davis can also be used to measure frequencies.

Regarding claim 1, Davis discloses a method for sensing, comprising:

Interrogating at least one optical sensor (108, 110, 112) (column 8, lines 28-32);

Interrogating at least one optical reference device (206b) co-located with the optical sensor (Figure 6) (column 8, lines 28-32);

Extracting a sensor optical frequency parameter from a signal received from the sensor (column 7, lines 65-67);

Extracting a reference optical frequency parameter from a signal received from the reference device (column 9, lines 15-21); and

Generating a corrected sensor optical frequency parameter based on the sensor and reference optical frequency parameters (column 9, line 22 to column 10, line 20 and column 4, lines 32-41),

wherein the optical sensor is sensitive to at least one measurand (temperature and pressure – column 8, lines 11-13)) and the reference device is insensitive to the at least one measurand (temperature only – column 8, lines 34-37).

Regarding claim 5, at least one of the optical sensors and the reference device of Davis comprises an optical waveguide Bragg grating (206b, 108, 110, 112).

In regards to claim 6, the optical sensor and the reference device of Davis each comprise a Bragg grating optically coupled to a common lead waveguide (column 8, lines 47-55).

Regarding claim 7, at least one of the sensor optical frequency parameter and reference optical frequency parameter comprises a change in an optical waveguide Bragg grating center frequency (column 2, lines 25-32). The device uses wavelengths of peaks in a spectrum of light to compensate for systematic error in the sensor measurements.

In regards to claim 20, Davis discloses a sensor system comprising:

A light source (204a) for generating interrogating light signals;

At least one optical sensor (108, 110, 112) optically coupled with the light source;

At least one optical reference device (206b) co-located with the sensor and optically coupled with the light source; and

Control circuitry (Figure 6) configured to interrogate the sensor with light from the light source to generate a sensor signal (column 8, lines 28-32), interrogate the reference device with light from the light source the generate a reference signal (column 8, lines 28-32), extract a sensor optical frequency parameter from the sensor signal (column 7, lines 65-67), extract the reference optical frequency parameter from the reference signal (column 9, lines 15-21), and generate a corrected sensor optical frequency parameter based on the sensor and reference optical frequency parameters (column 9, line 22 to column 10, line 20 and column 4, lines 32-41).

Regarding claim 22, the at least one optical reference comprises an optical waveguide Bragg grating (206b), and the reference optical frequency parameter comprises a change in center frequency of the optical waveguide Bragg grating (column 2, lines 25-32). The device uses wavelengths of peaks in a spectrum of light to compensate for systematic error in the sensor measurements.

In regards to claim 22, the reference and sensor of Davis' device share a common lead waveguide (Figure 6 and column 8, lines 47-55).

Claims 10, 11, 27, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Kersey (USPN 5,227,837).

In regards to claim 10, Kersey discloses a method for sensing at least one parameter comprising:

Interrogating a sensor interferometer (23) to generate a sensor signal responsive to the parameter (column 2, line 68 to column 3, line 3);

Interrogating a reference interferometer (27) co-located with the sensor interferometer to generate a reference signal insensitive to the parameter (column 3, lines 3-6, column 3, lines 19-30);

Extracting a sensor phase from the sensor signal (column 3, line 66 to column 4, line 1);

Extracting a reference phase from the reference signal (column 4, lines 1-4); and

Generating a corrected sensor phase based on the sensor phase and the reference phase

Regarding claim 11, the sensor interferometer and reference interferometer of Kersey's device share a common lead optical waveguide (17).

In regards to claim 27, Davis discloses a sensor system comprising:

A light source for generating interrogating light signals (15);

At least one sensor interferometer (23) sensitive to a parameter (29);

At least one reference interferometer (27) co-located with the sensor interferometer and configured to be insensitive to the parameter; and

Control circuitry (55) configured to interrogate the sensor interferometer with light from the light source to generate a sensor signal (column 2, line 68 to column 3, line 3), interrogate the reference interferometer with light from the light source to generate a reference signal (column 3, lines 3-6, column 3, lines 19-30), extract a sensor phase from the sensor signal (column 3, line 66 to column 4, line 1), extract the reference phase from the reference signal (column 4, lines 1-4), and generate a corrected sensor

phase based on the sensor and reference phases (column 5, line 55 to column 7, line 13).

Regarding claim 29, the sensor interferometer and reference interferometer share a common lead waveguide (17).

***Claim Rejections - 35 USC § 103***

Regarding claims 9, 27, and 28, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987). The sensing device and method claimed is intended to be used to measure parameters in an environment, such as the environment of a wellbore.

***Allowable Subject Matter***

Claims 15-19 are allowed.

Claims 3, 4, 8, 12-14, 21, 24-26, and 30-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

As to claims 3, 4, 24, and 25, the prior art of record, taken alone or in combination, fails to disclose or render obvious a method or system of scaling a reference optical frequency parameter by multiplying the parameter by a factor based



on the ratio of the light signal frequencies used to interrogate the reference and sensor devices, in combination with the rest of the limitations of said claims.

As to claims 8, 21, and 26, the prior art of record, taken alone or in combination, fails to disclose or render obvious the use of a sensor laser as a reference device in a method or system for sensing, in combination with the rest of the limitations of said claims.

As to claims 12 and 30, the prior art of record, taken alone or in combination, fails to disclose or render obvious a method or system of scaling a reference phase by multiplying the phase by a factor based on the ratio of the light signal frequencies used to interrogate the reference and sensor devices, in combination with the rest of the limitations of claims 12 and 30.

As to claim 15, the prior art of record, taken alone or in combinations, fails to disclose or render obvious the method of interrogating a reference device and optical sensor co-located with each other, and correcting the sensor signal for errors due to Doppler shifts based on the reference signal, in combination with the rest of the limitations of claim 15.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

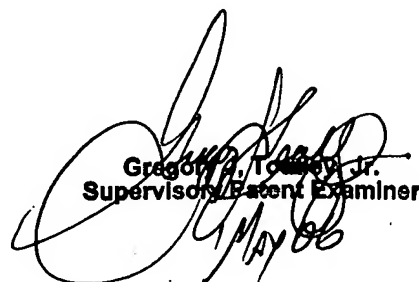
mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marissa J. Detschel whose telephone number is 571-272-2716. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on 571-272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Marissa J. Detschel  
April 21, 2006  
MJD

  
Gregory J. Toatley, Jr.  
Supervisory Patent Examiner